The Effects of the Opioid Crisis on Children's Speech and Language Development

An Honors Thesis (HONR 499)

by

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Abstract

As the United States continues to face the effects of the ongoing opioid crisis, it is critical to educate professionals working with children on the signs of Neonatal Abstinence Syndrome (NAS). Furthermore, it is important to understand the effects of this condition in order to provide adequate therapy and support for children diagnosed with NAS as infants. This topic has significant implications within the field of speech-language pathology because opioid dependency is a current and ongoing crisis within the U.S. It is reasonable to believe there will be a continual increase in children with a history of NAS in schools, so it is necessary for school-based professionals to understand the effects of NAS on children's speech and language development as well as their overall academic performance. This thesis aims to analyze the effects of prenatal opioid exposure on the communicative abilities in school-aged children and provide intervention strategies for children previously diagnosed with NAS.

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Process Analysis Statement

While writing my thesis, I gained a tremendous amount of insight into the deficits associated with Neonatal Abstinence Syndrome (NAS) and its long-term effects on children's speech and language development. Conducting research was the most challenging aspect of my thesis because of the limited case studies and research studies available. Since the opioid crisis is a recent epidemic in the United States, there have only been a few research studies published. More research will be essential in the understanding the full extent of NAS-related deficits.

I approached my thesis with very little knowledge of the opioid crisis and NAS. As I received updates constantly about opioid-related news on my phone, I wondered how this public health crisis would affect my career as a future speech-language pathologist (SLP). This curiosity led me to develop my thesis into a literature review discussing NAS, the effects of NAS on children's speech and language, and different types of intervention strategies. I included the intervention strategies because I wanted my thesis to be a manual for school-based SLPs who have children with NAS-related deficits on their caseloads.

I hope my thesis will become a guide to understanding the implications of prenatal opioid exposure on children's speech and language development. I hope it raises awareness and continues the conversation of the detrimental effects of opioids and the widespread severity of the opioid crisis in the U.S. I believe my thesis contains valuable information for all school-based professionals working directly with children. Despite difficulty finding current research, I believe I have learned a significant amount about children's speech and language delays related to prenatal opioid exposure. This knowledge will help prepare me for a future working with children as an SLP.

The Opioid Crisis

Recently, there has been a significant increase in the use of prescription and non-prescription opioids within the United States. In 2015, the National Survey on Drug Use and Health concluded approximately 91.8 million American adults used opioids, 11.5 million used illicit prescription opioids, 800,000 used heroin and 1.9 million had opioid use disorder (OUD) (Procter-Williams, 2018). According to Kolodny et al. (2015), opioid misuse has become a public health crisis due to the increase in morbidity and mortality coinciding with opioid addiction. This growing epidemic is largely caused by the over-prescription of opioid pain relievers as well as the use of illegal opioids including heroin. The unprecedented use of prescription and non-prescription opioids not only affects those taking opioids but can also affect children exposed to opioids during gestation.

The Centers for Disease Control and Prevention (CDC) found the incidence of NAS had increased 433% from 2004 to 2014 (Jilani et al., 2019). According to the Center of Behavioral Health Statistics and Quality, an estimated 26,000 pregnant women, ages 15 to 44, illicitly used prescription opioid pain relievers and/or heroin in 2015 (Procter-Williams, 2018). Jansson & Patrick (2019) found that the increase in opioid use among pregnant women is concurrent to the increase in the number of infants diagnosed with neonatal abstinence syndrome (NAS).

Neonatal Abstinence Syndrome

According to McQueen et al. (2016), NAS refers to the postnatal opioid withdrawal syndrome found in "55 to 94% of newborns whose mothers were addicted to or treated with opioids while pregnant." NAS is a complex disorder with a range of clinical signs in infants. It is associated with maternal use or misuse of opioids such as heroin or prescription painkillers, or

treatment medications such as methadone or buprenorphine. Each infant diagnosed with NAS will experience different symptoms along a continuum of clinical signs and withdrawal effects. NAS primarily affects the central and autonomic nervous systems and the gastrointestinal system. Clinical signs of NAS can range from mild tremors or irritability to fever and seizures. The severity of NAS can be impacted by numerous maternal, infant and environmental factors. Comorbidity of other medical conditions can also impact the severity of NAS. Unfortunately, researchers cannot currently predict the severity of NAS for each exposed infant. According to Jansson & Patrick (2019), "Timing of exposure during gestation, maternal stress associated with opioid use disorder (OUD), poor maternal nutrition, or lack of medical or obstetric care can affect the fetus and the intrauterine environment."

Research has indicated that controlling the mother's opioid use will help lessen the severity of withdrawal symptoms resulting from NAS. According to Proctor-Williams (2018), pregnant women should not gradually or suddenly discontinue opioid use during pregnancy as this could potentially harm the fetus and increase uncontrolled drug use by the mother. It is best-practice for opioid-addicted mothers to be monitored weekly for drug use. As a result, only 30-50 percent of their infants will experience severe symptoms of withdrawal or NAS. Current research on NAS has established diagnostic measures to identify symptoms in infants and to provide adequate treatment measures. Initial treatment measures include pharmacological interventions to mitigate withdrawal symptoms and to decrease opioid dependence in infants.

Research has indicated that children diagnosed with NAS as infants are likely to face cognitive, behavioral, developmental, and educational challenges or delays. A recent novel analysis by the Tennessee Department of Health suggests children with NAS are more likely to be referred for a disability evaluation, meet criteria for a disability and receive disability services.

The study found that 19.3% of children with a history of NAS were referred for a disability evaluation, in comparison to 13.7% of children without NAS. The study also found that 15.3% of children with NAS required classroom therapies or services compared to 11.7% of children without NAS. This data suggests a correlation between NAS and requiring disability services such as speech and language therapy (Fill et al., 2018).

Prevalence of NAS

Understanding the prevalence of opioid abuse can bring awareness to the growing population of school-aged children previously diagnosed with NAS. According to the CDC, opioid abuse has been identified as an epidemic due to the widespread impact across all communities and age groups. Unfortunately, children have been affected by opioid exposure in a variety of ways. Between 1997 and 2012, 13,052 children were hospitalized for prescription opioid poisonings. Additionally, an infant is born suffering from opioid withdrawal every 25 minutes. An estimated 21,732 infants were born with NAS in 2012. Some environmental risk factors often linked to opioid exposure in children are as follows: chronic poverty, inadequate health care, child abuse or neglect, alcohol abuse within the family, unemployment, a history of incarceration or poor parenting skills. Professionals working with children should be aware of these factors as they can indicate possible opioid exposure and can lead to a variety of symptoms and developmental delays in children.

Characteristics of Opioid Exposure in Children

Babies suffering from opioid withdrawal can present immediate neurological symptoms, feeding difficulties and failed hearing screenings. According to Proctor-Williams (2018), infants

diagnosed with NAS will have abnormal production of neurotransmitters when opioid receptors are suddenly cut off from continual stimulation. Resulting symptoms can include fussiness, gastrointestinal distress and feeding difficulties such as the inability to breastfeed or requiring a special formula. Low birthweight, skin conditions or other comorbidities are other possible symptoms of NAS (Brundage & Levine, 2019). Symptoms can appear between 24 to 72 hours after birth, depending on the opioid type and any other drugs used by the mother during pregnancy. These initial symptoms can last up to 30 days after birth. A key concern within the first few months is an infant's failure to thrive as a result of neurological, metabolic, vascular, and gastrointestinal symptoms.

The Finnegan Neonatal Abstinence Scoring System is used to assess NAS symptoms. Typically, nurses administer this assessment after feeding, around every three to four hours. An infant is diagnosed with NAS if he or she receives three consecutively high scores or two consecutive severe scores in three main areas. The first area includes symptoms of the central nervous system such as prolonged high-pitched crying, decreased sleeping after feeding, hyperactive Moro or startle reflex, tremors, myoclonic jerking and seizures. The second area of symptoms include metabolic, vasomotor and respiratory symptoms such as sweating, hyperthermia, sneezing, nasal stuffiness and increased respiratory rate. The final area of assessment includes gastrointestinal issues such as excessive sucking, reflux or vomiting, and loose stools (Proctor-Williams, 2018).

A post-NAS toddler or preschool-aged child may experience mental or motor deficits, cognitive delays, hyperactivity, impulsivity, attention deficit disorder (ADD), behavior disorders, poor social engagement, or failure to thrive. There are many potential symptoms of opioid exposure identified in school-aged children that can impact their academic performance. Some of

these potential symptoms include impaired literacy and arithmetic skills, memory and perception deficits, and various developmental delays.

Another disorder linked to opioid exposure in children is attention deficit hyperactivity disorder (ADHD), which is characterized by weak "executive functioning" and difficulty with planning, organizing, shifting between situations, and learning from past mistakes. As discussed in this thesis, opioid exposure can also lead to speech problems including difficulty producing speech sounds correctly or difficulty with voice or resonance. Language disorders in terms of receptive language (i.e., understanding others) and expressive language (i.e., sharing thoughts or feelings with others) are also linked to opioid exposure in children. Other symptoms include difficulty with self-regulation, behavioral issues, hypoxia or poor respiration, inability to manage stress, depression, or future substance abuse (U.S. Office of Special Education Programs, 2018).

Research on Opioid-Related Developmental Delays

While research suggests a correlation between gestational opioid use and developmental delays resulting from NAS, specific delays and disorders tied to NAS currently remain unknown. As symptoms of NAS dissipate, children no longer have the NAS label. However, research studies are discovering that NAS has a lasting effect on children's development. The effects of NAS can impact neurodevelopmental outcomes past infancy. Studies show that toddlers, preschoolers and school-age children post-NAS score considerably lower on cognitive and intelligence testing than non-opioid-exposed control groups. Assessments of behavioral disorders in the school-age population reveal disorder rates ranging from 26% to more than 50% for children with a history of opioid exposure. Another study reported opioid-exposed children show similar attention skills to children diagnosed with ADHD.

Several recent studies have been conducted to determine the effects of opioid exposure on children's speech and language development as well as their academic performance. A recent longitudinal study on the effects of NAS on language delay found that 24% of the NAS sample presented signs of a language delay by 10 years of age. The researchers also determined a significant difference in the pattern of language delays over time between the NAS group and the non-NAS group. Interestingly, at five years, children with a history of NAS had a decreased risk of developing language delays than children in the non-NAS group. However, at 10 years of age, children with a history of NAS had an increased risk of developing language delays than those not diagnosed with NAS.

The results of this study conclude children with NAS can experience varying rates of increased risk for language delays depending on their developmental stage. This study provides some insight into the effects of NAS on language development, but more research is necessary to determine which developmental stages are at a higher risk for post-NAS-related language delays. An increase in developmental surveillance and referrals for special education services are also needed to diagnose and treat language delays in post-NAS children (Miller et al., 2020).

In a recent retrospective study, researchers evaluated the neurodevelopmental outcomes in infants treated for NAS. Their research indicated that children with NAS received lower scores on all three subscales (cognitive, language, and motor) of the Bayley Scales of Infant Development, 3rd Edition. Although scores were within the normal range in most cases, the four to six-point difference in Bayley scores is suggested to be clinically significant. According to their research, children who lived with foster/adoptive families had higher cognitive scores than children who lived with biological relatives. This study indicates a correlation between NAS in infants and a greater risk for developmental delays during infancy (Merhar et al., 2018).

A literature review by Maguire et al. (2016) examined the correlation between prenatal heroin exposure and behavioral and cognitive deficits. One of the studies found that children between the ages of three and six who were prenatally exposed to heroin had lower height, birthweight, and head circumference. These children also performed much poorer on the Columbia Mental Maturity Scale than the control group. The opioid-exposed group scored lower on the cognitive, perceptual, quantitative, and memory subscales of the McCarthy Scales of Children's Abilities compared to the control group.

In a follow-up report, 65% of the opioid-exposed children repeated one or more grades or needed special education services. According to the same literature review, prenatal methadone exposure has been associated with short attention span and hyperactivity in toddlers. Research has also indicated other developmental deficits including impaired verbal and performance skills, visuomotor weakness and poor perceptual abilities. Interestingly, research found impaired memory and perception in school-age children with a history of prenatal opioid exposure. Prenatal exposure to buprenorphine has also been linked to hyperactivity, impulsivity, and attention problems in children ages five to six years.

Intervention Methods

The growing population of school-aged children diagnosed with NAS requires early and adequate intervention methods. Methods such as perinatal and neonatal NAS interventions and pharmacologic therapy aim to decrease complications associated with NAS directly after birth. Other intervention methods include treatment programs for substance-addicted mothers designed to improve the child's household environment and support the relationship between mother and child. These methods are essential in creating the best possible outcome for the child.

Several professionals can provide assessments and interventions to help diagnose and treat infants and children affected by opioid exposure. A speech-language pathologist (SLP) can help infants with feeding and swallowing disorders. Infants with NAS often struggle with feeding because of their poor sucking reflex or prolonged crying during scheduled feedings. Maguire et al. (2018) found that keeping the infant calm and comfortable was the most effective strategy for successful feeding. Feeding therapy for infants with NAS is essential for NICU discharge and lessening the severity of possible symptoms or developmental delays.

Audiologists are also among professionals evaluating and treating infants with NAS. They will receive referrals for infants who fail the newborn hearing screening, which can be an indicator of possible NAS. One study suggests that infants exposed prenatally to opioids are oftentimes referred for a second auditory brainstem response (ABR) test after failing the initial newborn hearing screening. Depending on the type of opioids and other drugs taken by the mother during pregnancy, the infant can have an increased risk for developing a hearing loss. It is also possible for a child with NAS to fail a newborn hearing screening because of extreme fussiness and irritability. Although many factors can contribute to increased ABR referral rates, one study found that nearly 30% of infants prenatally exposed to methadone were referred for ABR testing. While more research is necessary to determine a true correlation between NAS and failed initial newborn hearing screenings, this information can be used for early identification of NAS, which is essential for implementing effective interventions (Proctor-Williams 2018).

Intervention methods for school-aged children with NAS can improve speech and language deficits linked to prenatal or childhood opioid exposure. These intervention types include play therapy, attention process training, cognitive behavioral therapy, language and literacy interventions, and speech and language services. Each intervention type targets

articulation, fluency, receptive and expressive language, cognitive aspects of communication (attention, problem-solving, and executive functioning), or social aspects of communication (challenging behavior or ineffective social skills).

Play therapy uses the concept of "symbolic play" to enhance emotional and cognitive development. Three types of toys are used in play therapy including real-life toys (e.g., dollhouses or toy kitchens), aggressive toys (e.g., action figures or nerf guns), and creative expression toys (e.g., Legos or crayons). According to Kool and Lawver (2010), engaging in play therapy allows children to develop pragmatic skills, problem-solving skills, emotional expression, social and relational skills, empathy and respect for others, and self-efficacy. Play therapy can be an effective intervention strategy for developing expressive language skills and pragmatic skills in school-aged children.

Attention process training is an intervention strategy used to develop and strengthen cognitive-linguistic skills in children with NAS. This method focuses on attention, nonverbal reasoning, and generalization deficits to improve cognitive functioning and overall learning. Attention process training emphasizes repetition of words to regain a child's focus. For example, the school-based professional would say the student's name while making eye contact to maintain engagement. This intervention allows for deeper engagement with students for longer time periods which helps facilitate learning and improves academic performance.

Cognitive behavioral therapy is a school-based group or individual intervention used to address posttraumatic stress disorder (PTSD) and behavioral problems to help improve a child's overall functioning, academic performance, classroom attendance, peer and parent relationships, and coping skills. Cognitive-behavioral techniques such as social problem solving, relaxation, cognitive restructuring and exposure therapy are used to help students recognize and stop

negative patterns of behavior. The Office of Special Education Programs (2018) found that students demonstrate reduced behavioral problems and improved functioning after receiving cognitive behavioral therapy.

Language and literacy interventions are designed to help students improve their language and literacy skills, which in turn, will impact their academic performance. Since opioid exposure can affect children's language development, interventions are necessary to help facilitate the mastery of both language and literacy skills. These interventions target oral language, phonological awareness, spelling, fluency, and comprehension. Younger children benefit from regularly incorporating the reading into daily language. Consistently repeating the method of teaching a particular skill will help increase the likelihood of a skill occurring in the future. Asking concrete questions helps improve language and reading comprehension in older children.

Lastly, speech and language services are used to diagnose and treat speech, language, social communication and cognitive communication. Individualized or group interventions use modeling and prompting techniques to elicit targeted speech sounds or language constructs. Naturalistic speech and language interventions involve creating an environment designed to elicit target responses. Research by the Office of Special Education Programs (2018) found that children who receive speech and language services will show improvement in speech intelligibility, conceptual understanding, problem-solving skills, and overall school readiness.

Further Implications

As the opioid crisis continues to increase, audiologists and SLPs will continue to encounter more NAS and post-NAS children in their clinics or on their caseloads. In order to provide adequate intervention for this growing population, these professionals will require

accurate medical and school records for quick identification of NAS-related deficits. Difficult conversations with mothers, families, caregivers and teachers about sensitive issues related to maternal drug use during pregnancy are necessary to gain this information. These conversations should be private – not occurring during an IEP meeting involving the caregivers and other school-based professionals.

When discussing this information, it is essential for professionals to be respectful and provide factual information regarding concerns. School-based SLPs can collaborate with other professionals such as child psychologists, social workers, special educators and school administrators. It is essential for SLPs to advocate for important health documentation to be included in school records. This helps to identify a previous diagnosis of NAS or any other comorbidities affecting a child's learning abilities. Inter-professional collaboration is important because post-NAS presents a range of deficits requiring expertise from both medically based and school-based professionals.

In order to best understand a post-NAS child's deficits, school-based professionals should expand their knowledge of children's communication, literacy and hearing as these areas can be significantly impacted by opioid exposure. The limited empirical research on the opioid crisis within the United States provides some difficulty understanding the extent of children born with NAS. Unfortunately, there are some communities showing an increase in opioid dependency, particularly in the Midwest. However, state and local efforts to prevent and treat opioid dependency will help reduce the number of infants diagnosed with NAS.

As the number of post-NAS children increases in schools, it is important for school-based professionals to recognize the signs associated with prenatal opioid exposure. Some of these signs include poor academic performance resulting from impaired executive function and

developmental delays affecting cognition, social skills, speech, and language. Professionals working with post-NAS children should advocate for more research on this population to create evidence-based assessments and effective intervention methods (Proctor-Williams, 2018).

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